

# Genes in concert

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# Genes in concert | a toxicogenomics hymn towards disease prevention





# Toxicological research

A world full of potential hazards





# Toxicological research

Human studies: the Praegustator



# Toxicological research

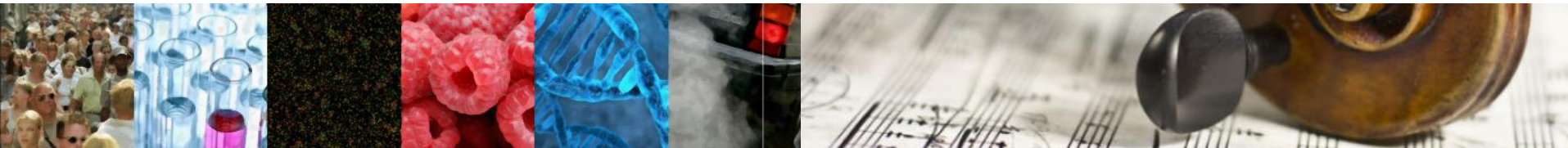
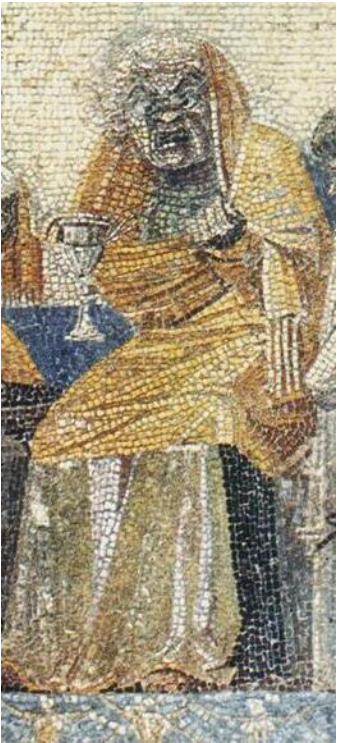
Animal studies as an alternative for humans





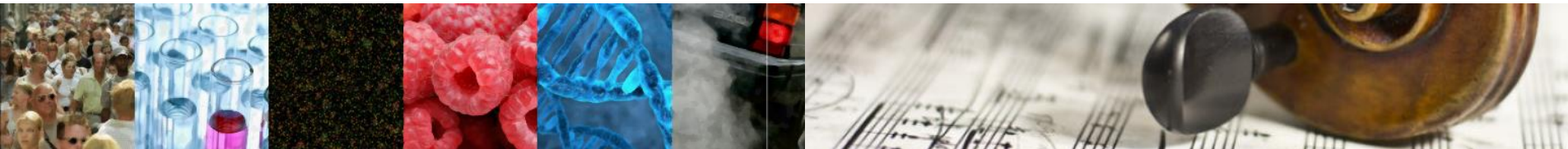
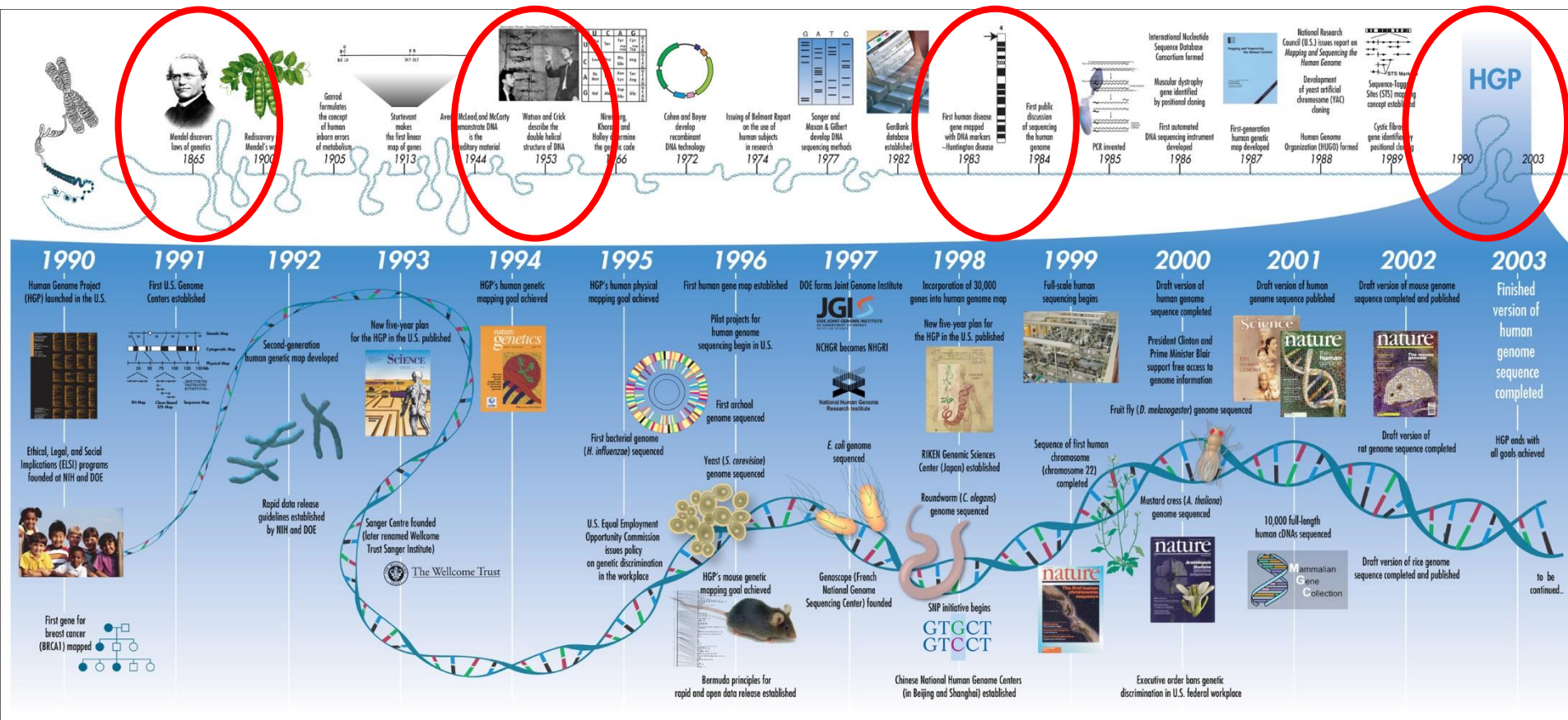
# Toxicological research

Cell cultures as alternative to animals as alternative for humans

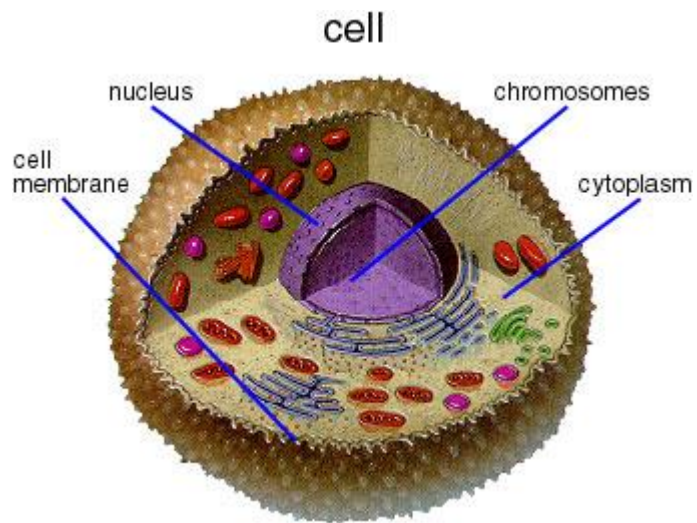


# Toxicogenomics

A revolution initiated by the human genome project

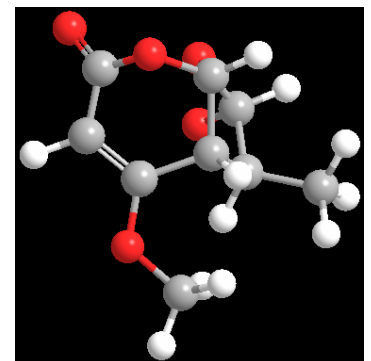
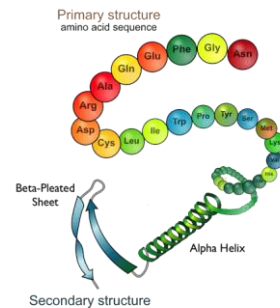






Toxicant

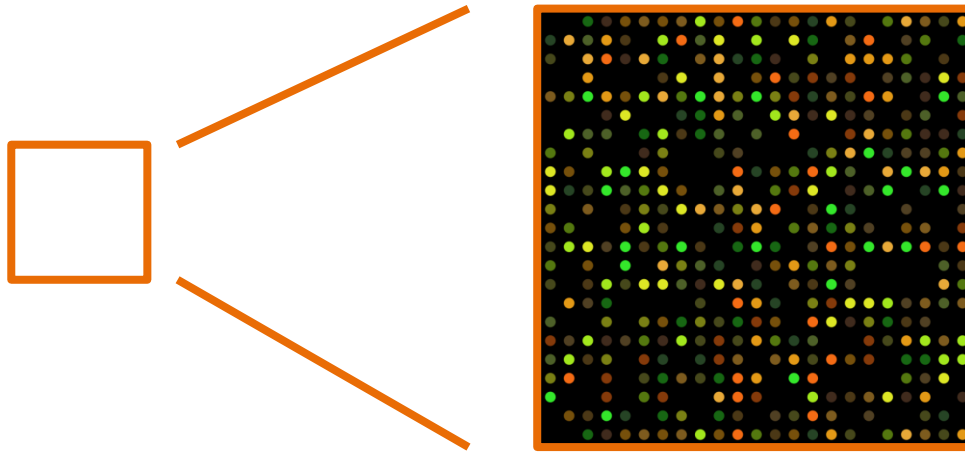
DNA → RNA → Proteins → Metabolites



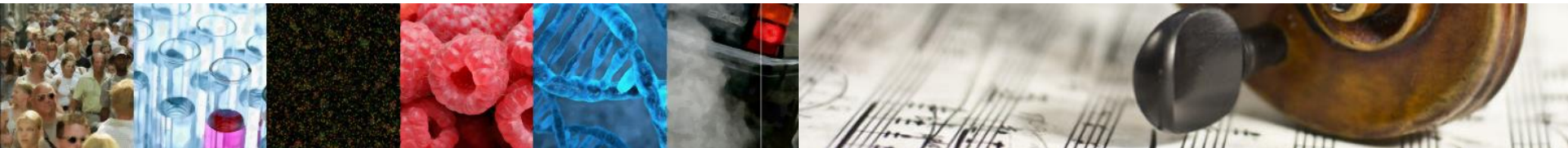
Elimination



# High-throughput techniques

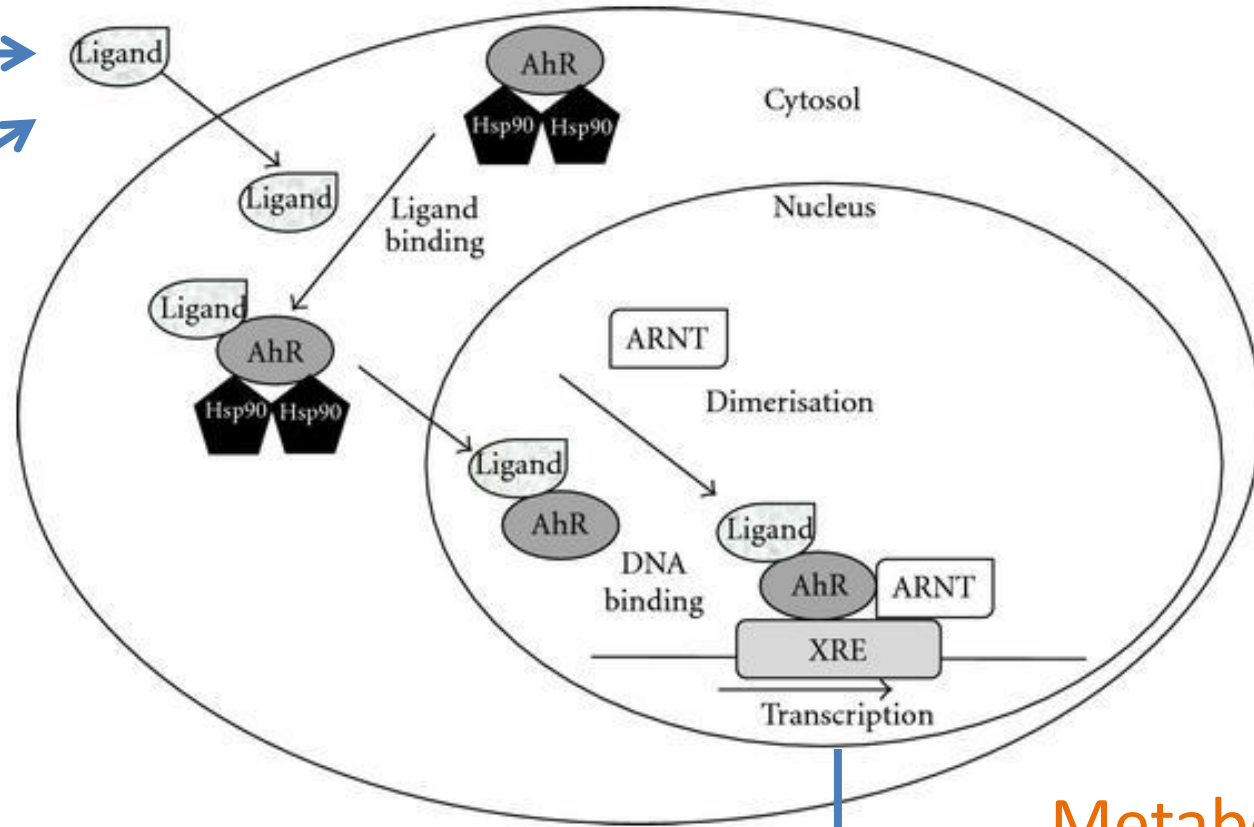


Human gene expression microarrays

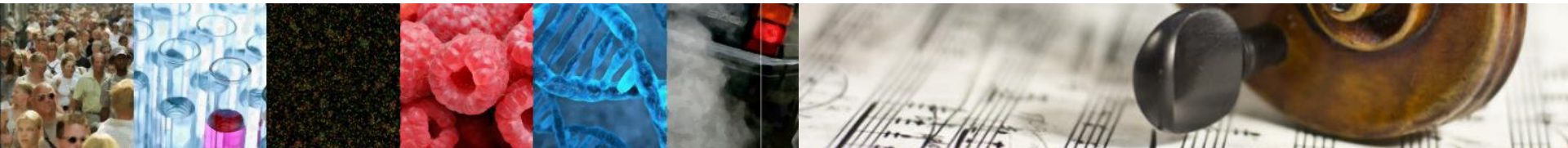


Dioxin

BaP



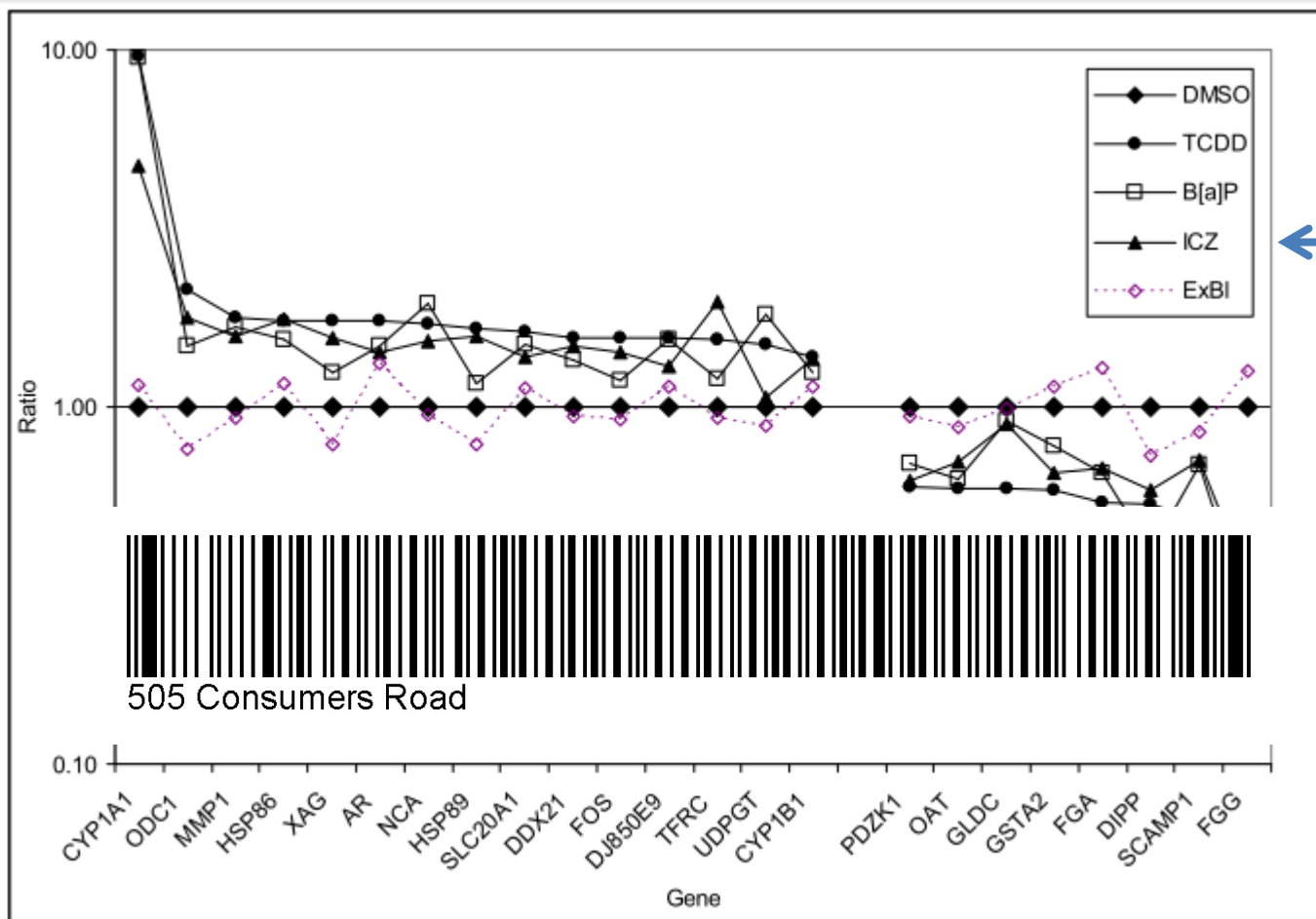
Metabolic  
enzymes





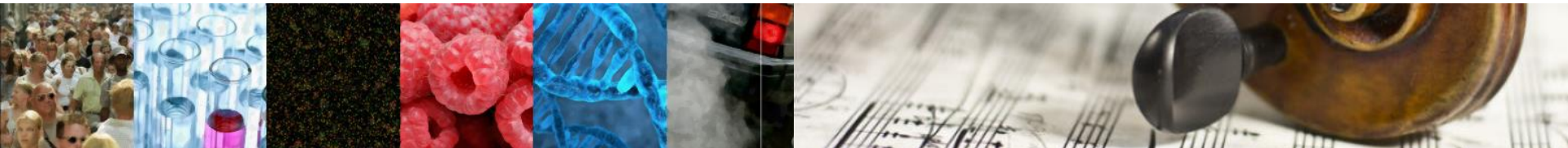
# Gene expression profiles:

a barcode for potential toxicity



# Genes in concert

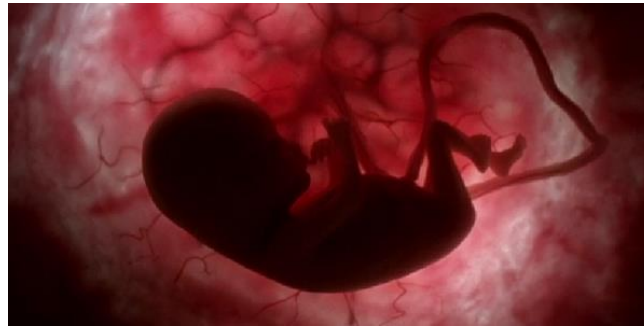
How to interpret gene expression profiles



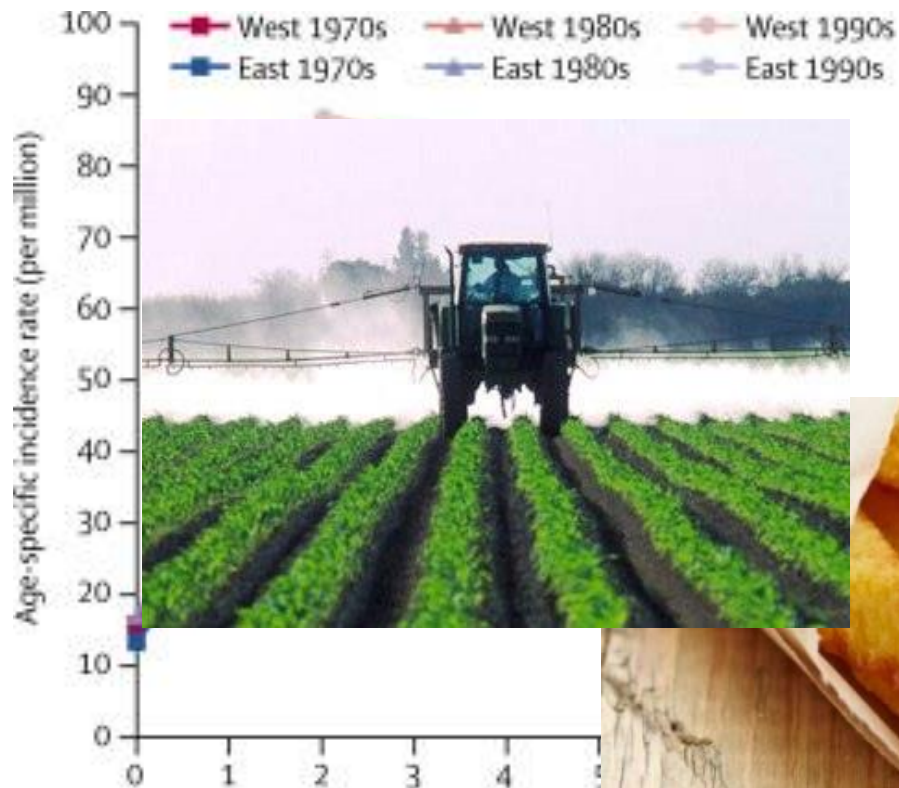


# Human population studies

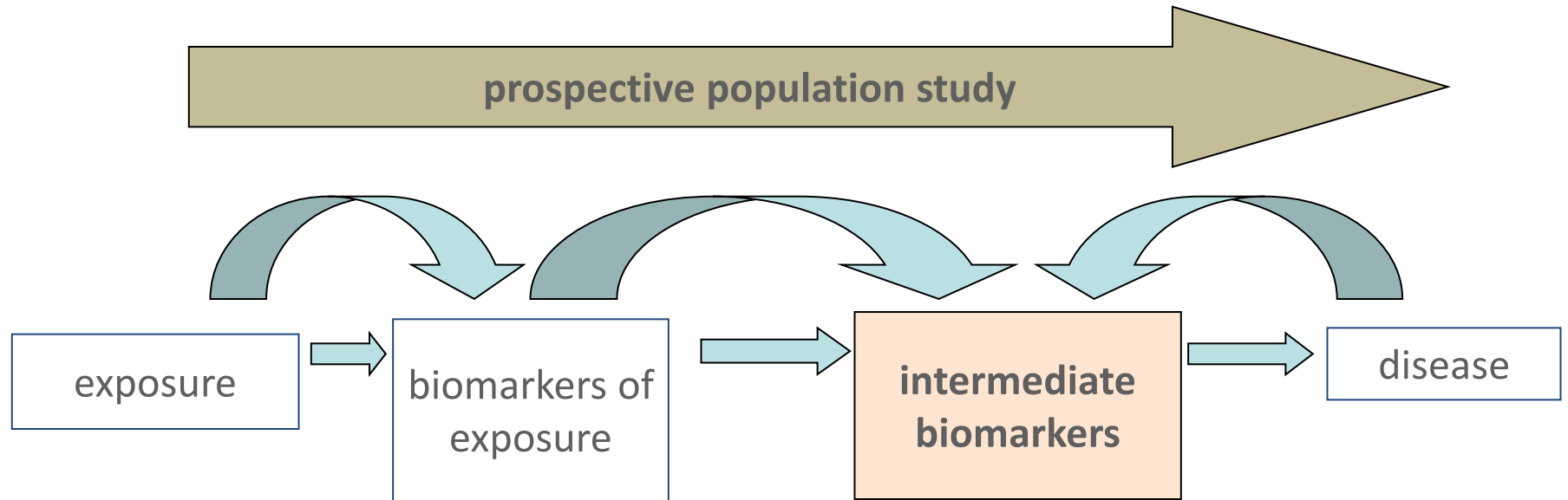




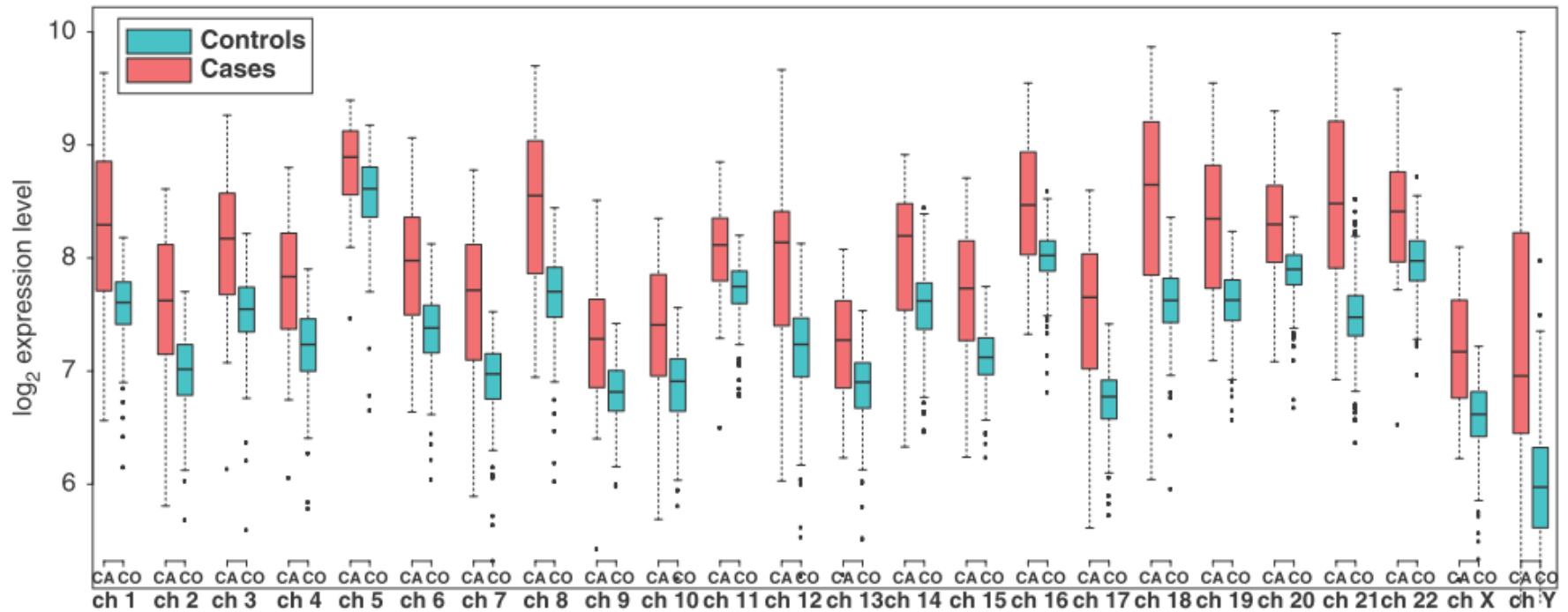
## Lymphoid leukaemia in children







## Chronic lymphocytic leukemia







methylation

miRNA

protein degradation

DNA



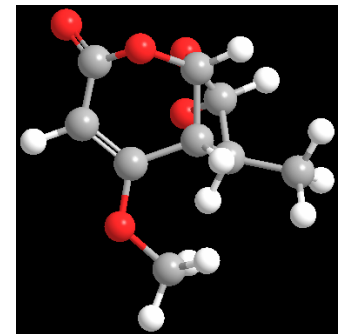
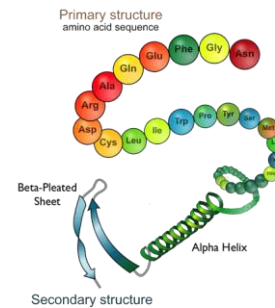
RNA



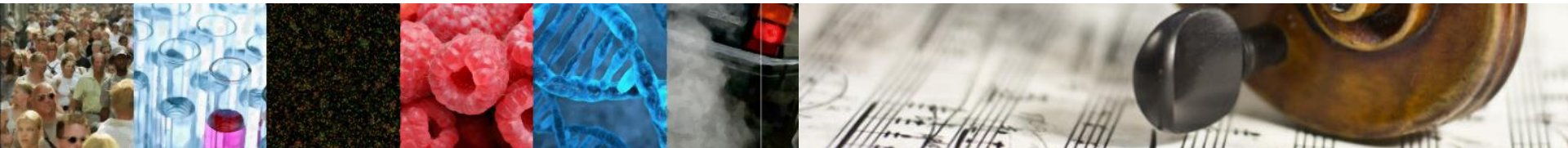
Proteins



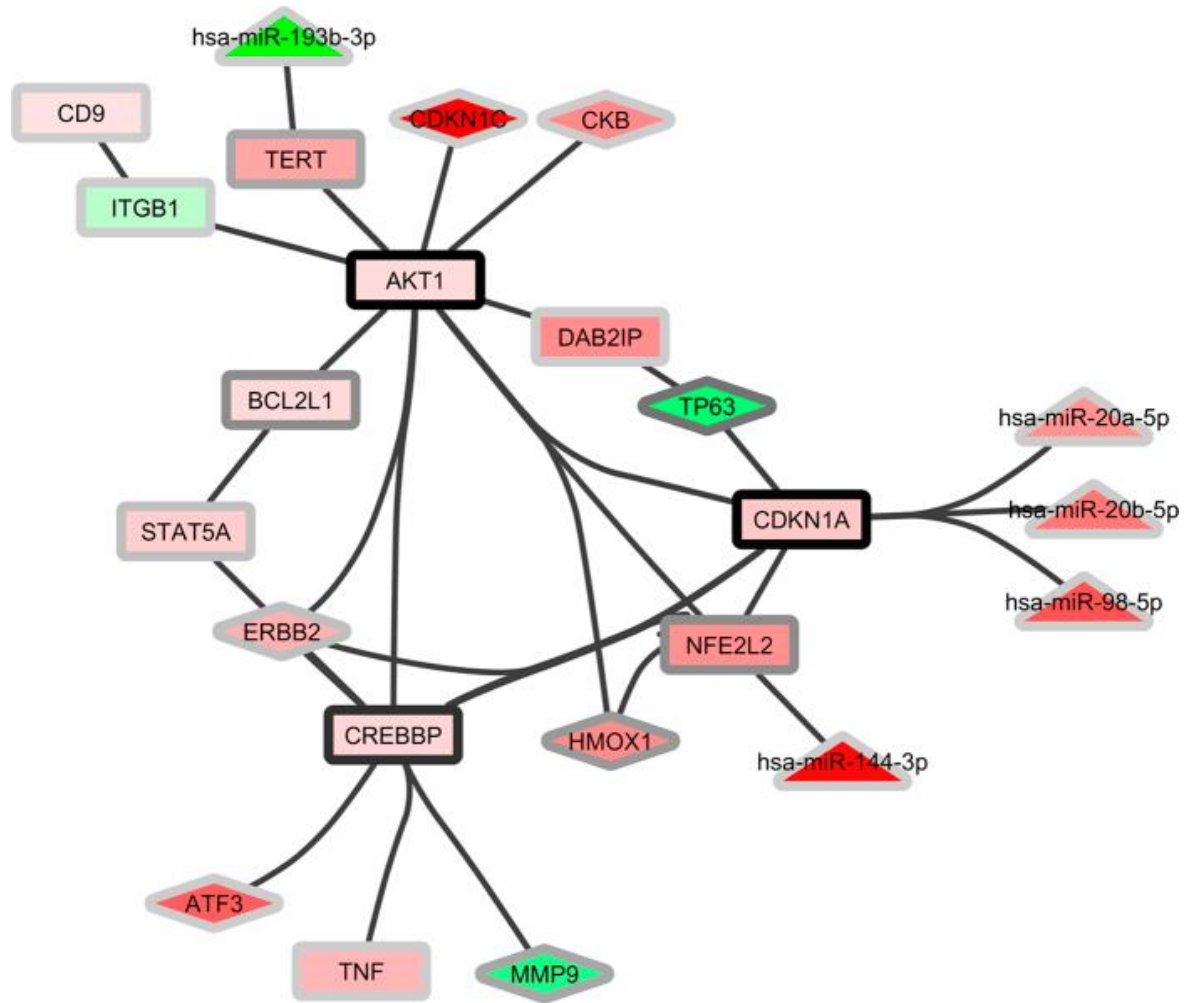
Metabolites



## Smoking as proof-of-principle







# HUMAN VARIATION

A Genetic Perspective on Diversity, Race, and Medicine



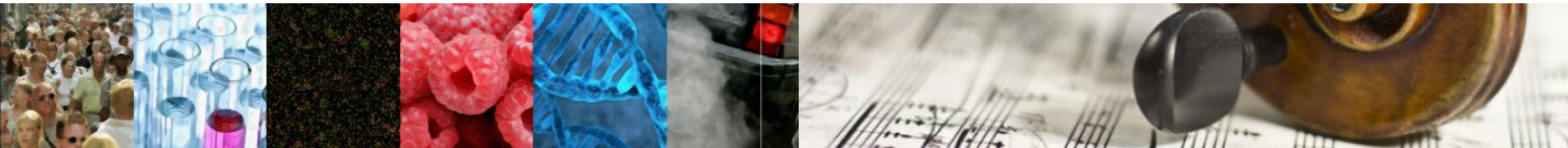
Editor  
ARAVINDA CHAKRAVARTI

Genetic polymorphisms

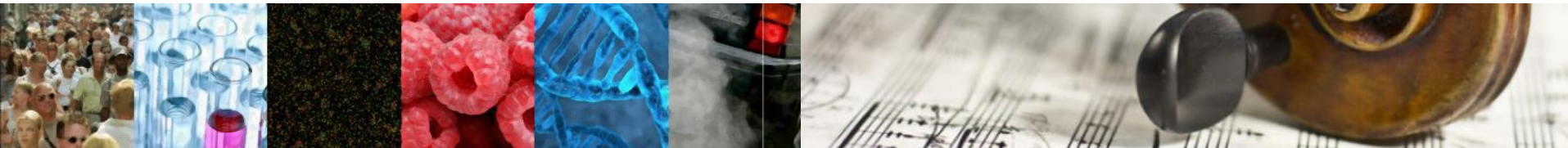




# Prediction

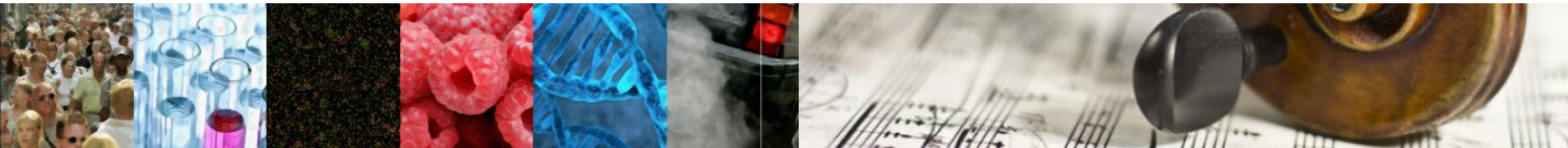


# Prediction





# Prediction: the national hymn



# Environmental Health studies



# Multidisciplinary research

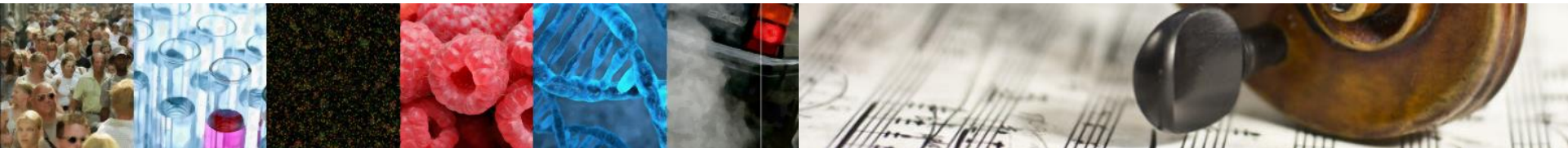


MAASTRICHT CENTRE FOR SYSTEMS BIOLOGY

Science Day 2016

**May 17<sup>th</sup>, 2016**

Maastricht - The Netherlands







Prevent readmission  
System change integrate change  
Treating whole person  
Community structure for healthy lifestyle  
Help patients  
nutrition education  
Improve health healthy lifestyles change lifestyles  
be part of the solution  
personal responsibility  
prevent readmission  
live well  
mobilize change lives  
Self Advocacy prevent chronic disease  
Upstream health equity  
Empowering

# CHRONIC DISEASE PREVENTION





American Institute for  
Cancer Research

supports the

International Agency for Research on Cancer

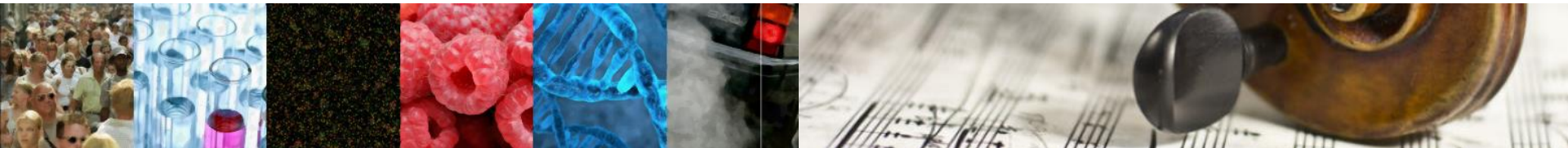
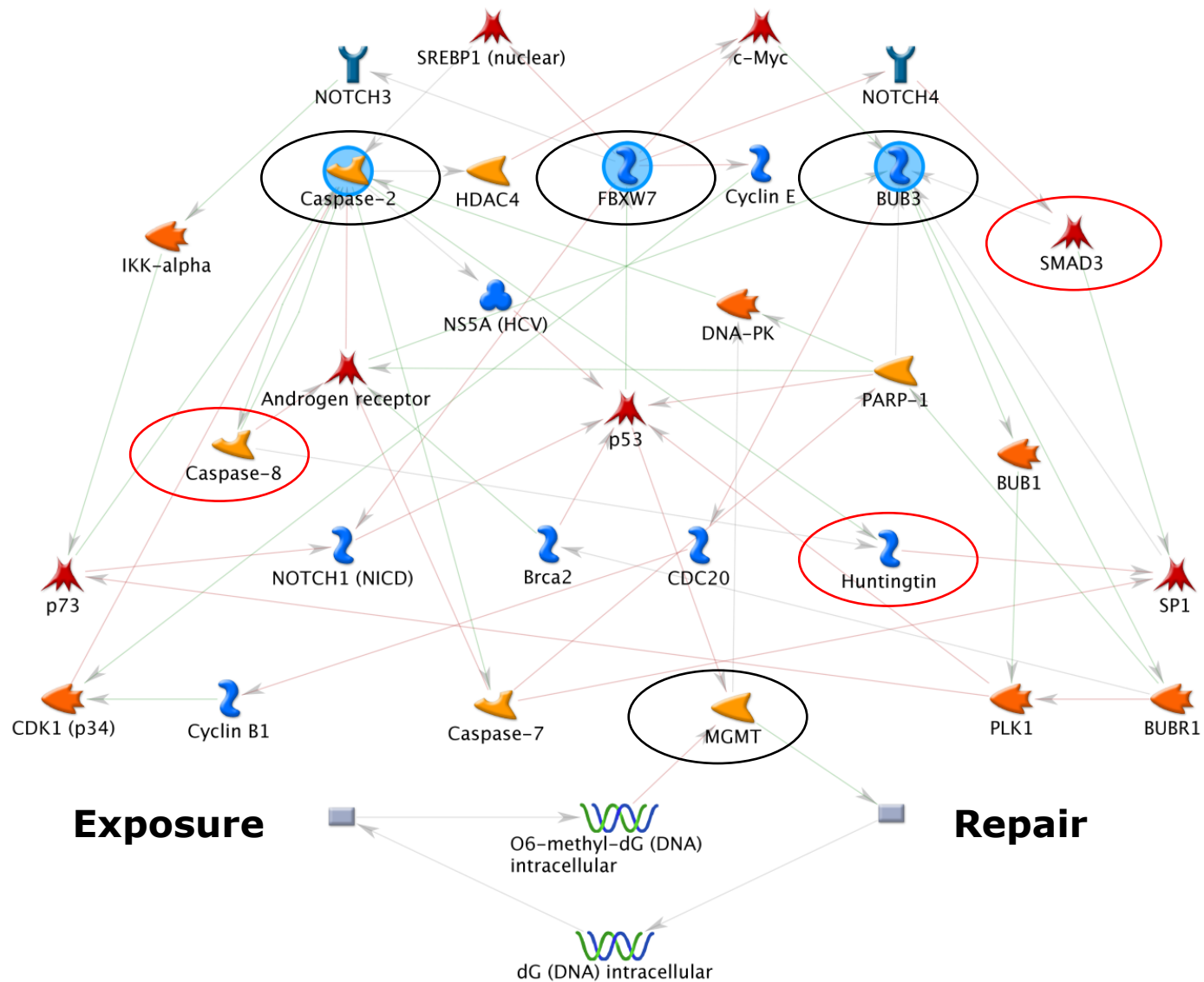
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World Health  
Organization's

classification of processed meat as  
“carcinogenic to humans.”









Dagblad De Limburger /  
Limburgs Dagblad.

Dinsdag, 08 december 2015

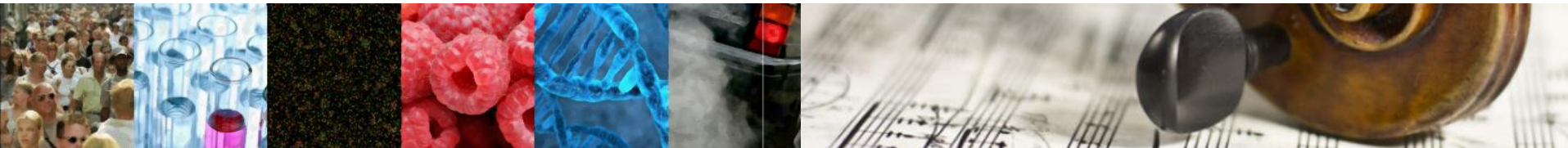
## Groene thee in de Salami!

Onderzoekers van de Universiteit Maastricht (UM) en collega's in Europa hebben drie jaar gewerkt aan 'veilige' worst, ham en andere vleeswaren zónder extra risico's op darmkanker. Hoogleraar Theo de Kok van de UM geeft een kijkje in de keuken.



# PHYTOME

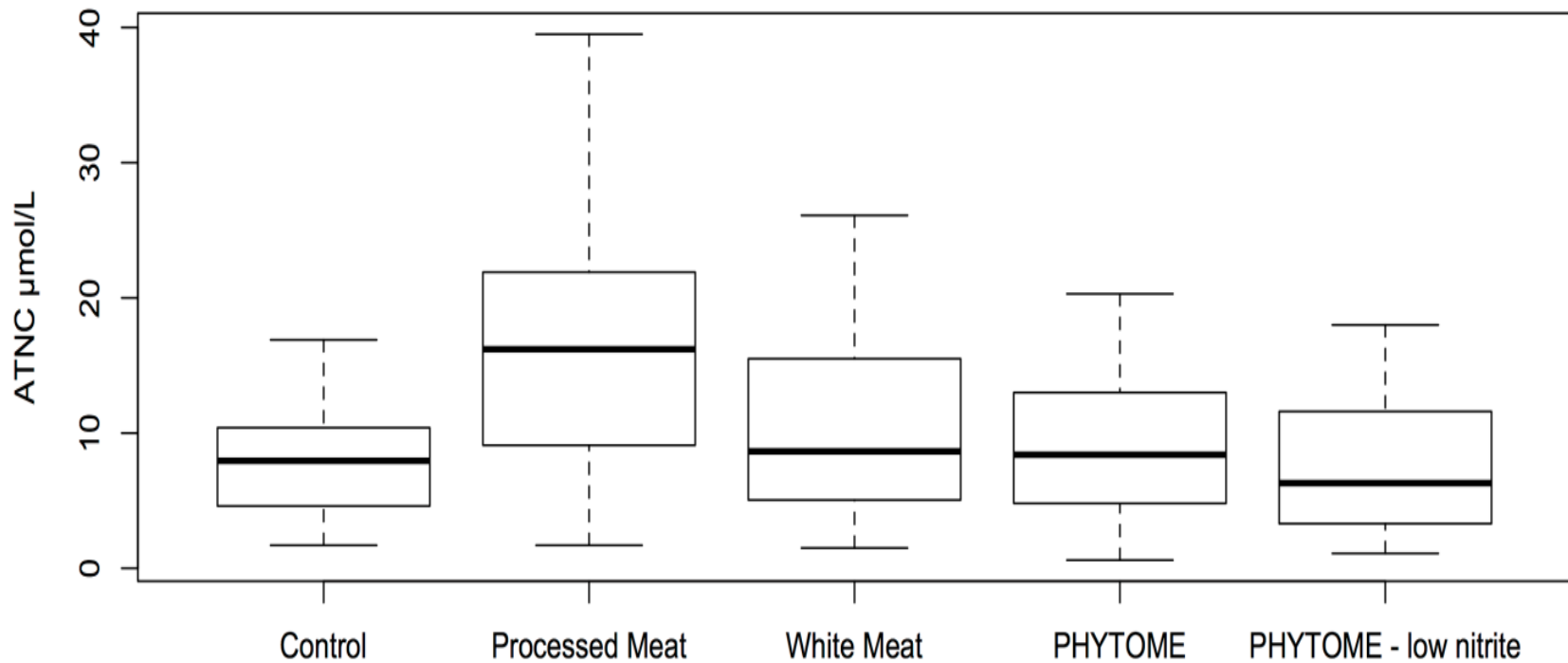
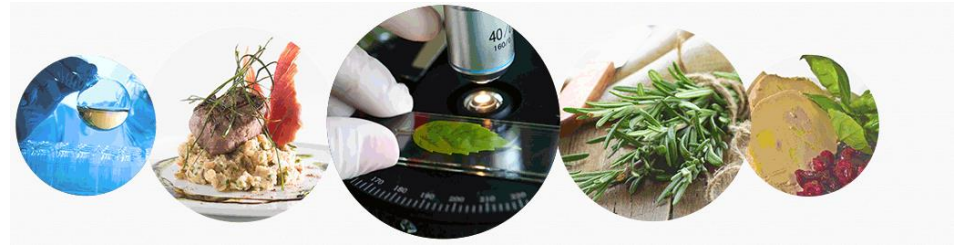
Phytochemicals to reduce  
nitrite in meat products



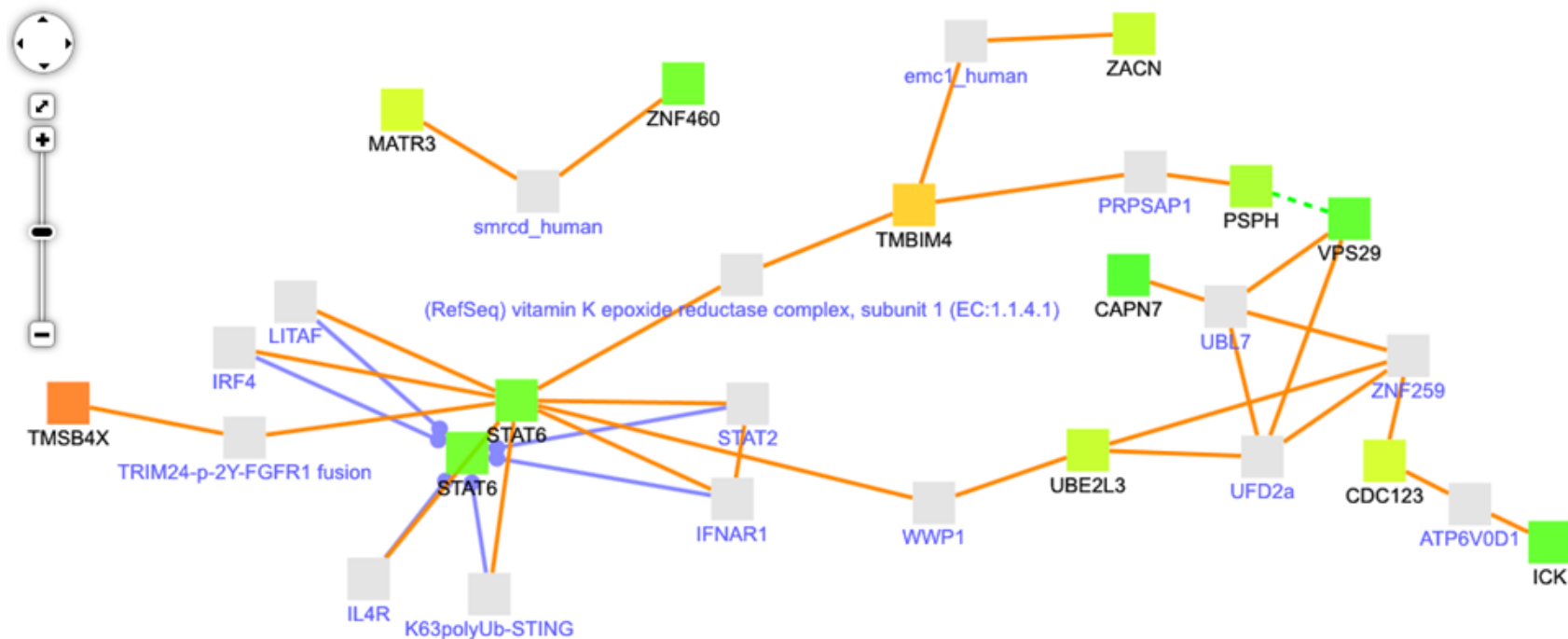


## PHYTOME

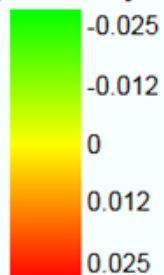
Phytochemicals to reduce  
nitrite in meat products







#### Physical entity color



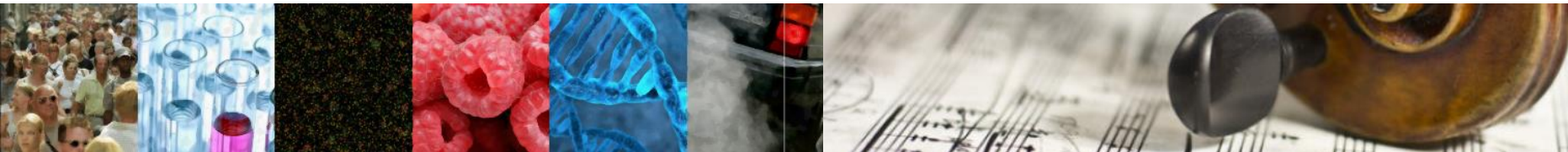
#### Interaction color

- protein interaction
- genetic interaction
- biochemical reaction
- gene regulatory interaction
- drug-target interaction

#### Node label color

**black** node labels denote seed nodes;  
**purple** node labels denote intermediate nodes

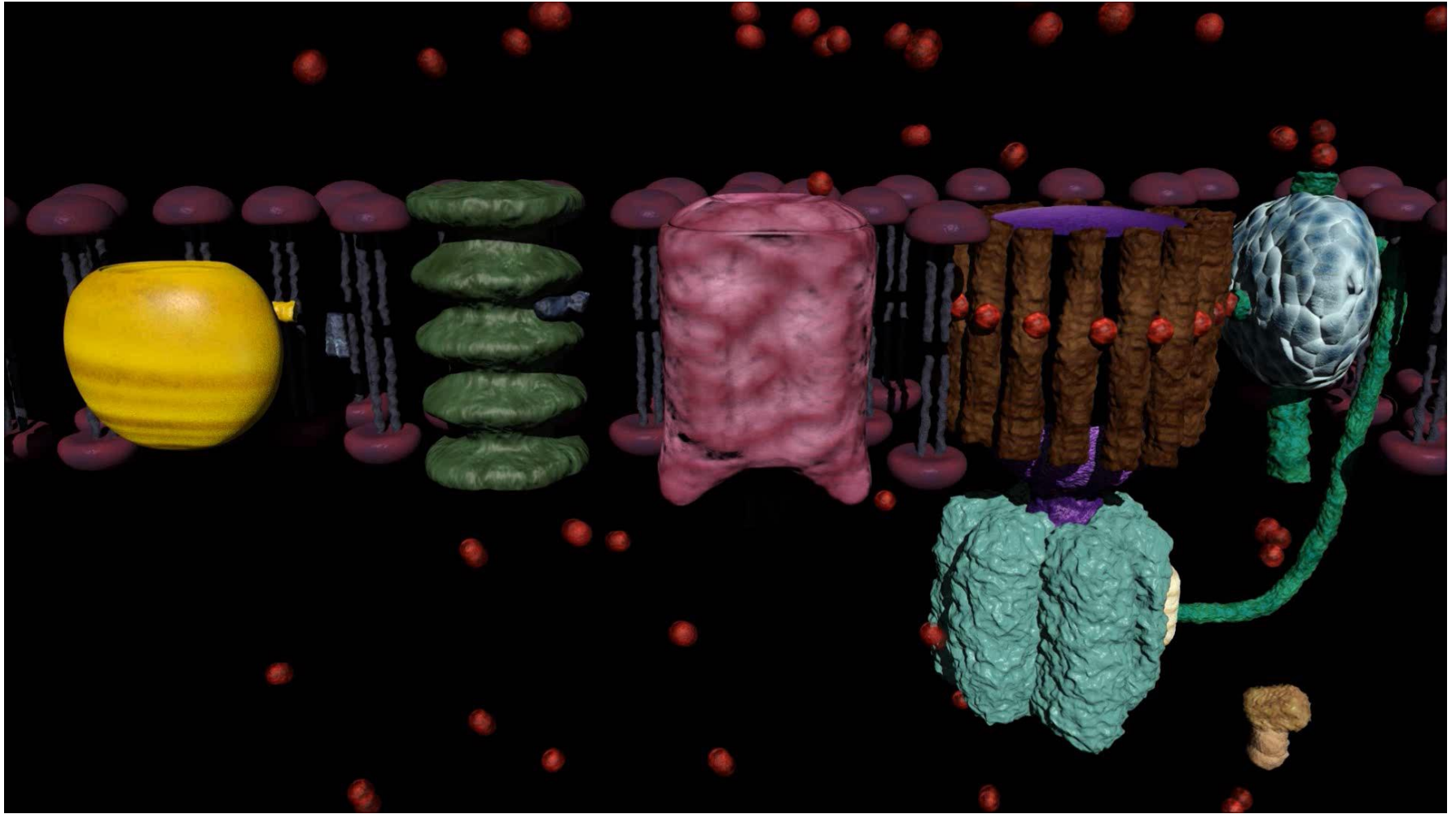
Hide legend




$$1 + 1 = 3$$

## A GUIDE TO FOOD SYNERGY

How 2 foods paired together  
can increase nutritional benefits







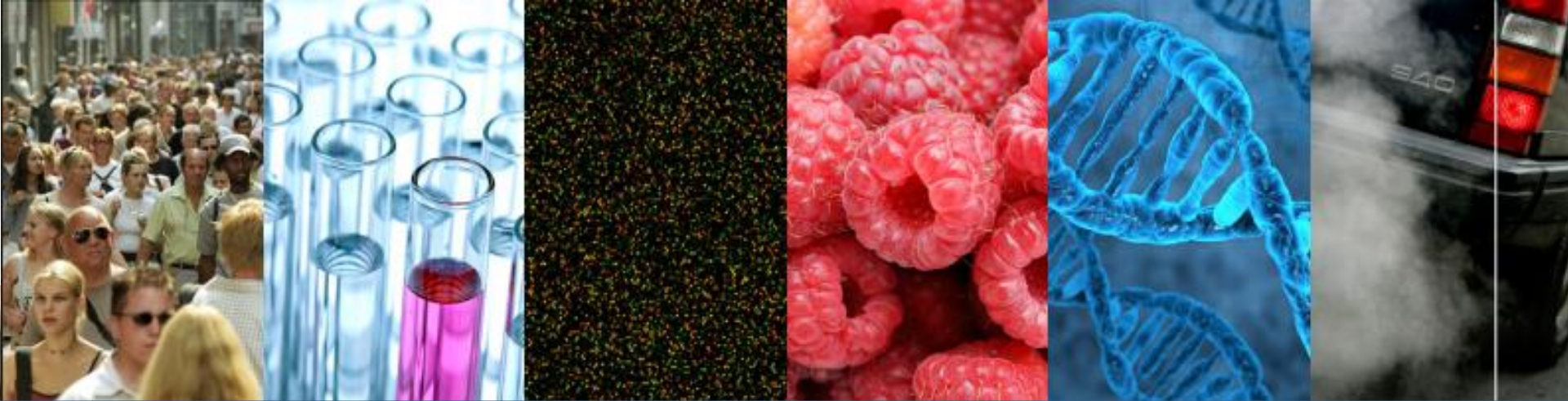
## Education



Brightlands







Keep calm |  
and acknowledge all musicians in the orchestra

